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Papillary muscle infarction and cardiovascular outcomes

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Introduction

Recent studies suggest that papillary muscle infarction (PMI) detected by contrast enhancement cardiac magnetic resonance (ce-CMR) may correlate with mitral regurgitation and reduced left ventricular ejection fraction (LVEF). However, there is scant data about the association of PMI with cardiovascular outcomes.

Purpose

To determine the prognostic significance of PMI, detected by ce-CMR, in patients with ischemic (ICM) and non-ischemic cardiomyopathy (NICM).

Methods

We evaluated the images of 456 consecutive patients who underwent ce-CMR for the assessment of left ventricular function and viability. PMI (both antero-lateral and postero-medial papillary muscles), ICM and NICM were assessed by visual assessment by interpreters blinded to clinical data. All patients had a LVEF $\leq 50\%$. ICM and NICM were determined by presence and pattern of hyper-enhancement. Patients were followed by telephone interview for the following outcomes: all-cause mortality, exacerbation of CHF, defined as a decrease in NYHA functional class, myocardial infarction or re-hospitalization due to a cardiac etiology.

Results

Our study population consisted of 320 patients with ICM and 136 with NICM (mean age: 63 years; males:

66%). The prevalence of PMI was 66% and 12% in the ICM and NICM patients, respectively. There was a higher prevalence of postero-medial PMI compared to antero-lateral PMI in both the ICM and NICM (66% vs. 30% and 63% vs. 38% respectively). Mean follow up was 2.8 ± 1.8 years.

Presence of PMI was associated with a significantly higher incidence of all-cause mortality and cardiovascular outcomes (11% vs. 4%, $p=0.02$ and 54% vs. 42% $p=0.009$, respectively). Patients with both papillary muscles infarcted had a higher incidence of all-cause mortality and cardiovascular outcomes compared to patients with no PMI (30% vs. 4%, $p<0.01$; 53% vs. 42%, $p<0.05$). In addition, postero-medial PMI was associated with a higher incidence of cardiovascular outcomes and worsening of CHF compared to patients with no PMI (57% vs. 42%, $p<0.05$; 38% vs. 27%, $p=0.019$). After multiple logistic regression analysis, both PMI and poster-medial PMI were independent predictors of cardiovascular outcomes, and patients who had both papillary muscles infarcted had a higher incidence of death (Table 1).

Conclusions

Papillary muscle infarction and postero-medial PMI are independent predictors of combined cardiovascular outcomes. Postero-medial PMI is more prevalent than antero-lateral PMI and is also an independent predictor of worsening CHF.

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Table 1 Univariate and multivariate logistic regression analyses of cardiovascular (CV) outcomes

Variable	Univariate analysis (Odds Ratio)	95% CI	P-value	Multivariate analysis (Odds Ratio)	95% CI	P-value
Papillary muscle infarction						
Death	3.39	1.49-7.67	0.003	2.05	0.82-5.0	0.12
Combined CV outcome	1.64	1.13-2.37	0.09	1.53	1.01-2.32	0.04
Stratified by location and number of papillary muscle infarctions						
Both postero-medial and antero-lateral						
Death	11.66	4.9-29.9	<0.001	7.09	2.35-29.35	<0.001
Worsening CHF	0.63	0.29-1.33	0.25	0.50	0.21-1.17	0.11
Combined CV outcome	1.56	0.83-2.93	0.16	1.32	0.66-2.63	0.43
Postero-medial						
Death	1.6	0.96-2.64	0.68	1.84	0.9-2.8	0.7
Worsening CHF	1.65	1.04-2.61	0.03	1.60	0.96-2.64	0.06
Combined CV outcome	1.84	1.19-2.84	0.006	1.73	1.07-2.77	0.02
Antero-lateral						
Death	3.06	0.95-9.77	0.06	2.16	0.61-7.62	0.23
Worsening CHF	0.67	0.31-1.42	0.29	0.63	0.28-1.38	0.25
Combined CV outcome	1.30	0.68-2.34	0.44	1.25	0.65-2.39	0.49
Clinical variables				Multivariate Analysis for Death		
Age				1.031	0.99-1.06	0.008
Gender				1.47	0.63-3.41	0.37
CHF				1.59	0.66-3.76	0.29
Myocardial infarction				1.30	0.56-3.0	0.54
Valve Dysfunction				2.54	1.1-5.39	0.029
Ejection Fraction				0.97	0.94-1.0	0.05
Smoking				0.43	0.05-3.38	0.42
Hypertension				0.87	0.33-2.25	0.77
Diabetes				1.43	0.65-3.12	0.36
Revascularization				0.88	0.37-2.08	0.77

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